

AMENDMENT OF SOLICITATION/MODIFICATION OF CONTRACT				1. CONTRACT ID CODE <div style="text-align: center;">J</div>		PAGE OF PAGES <div style="display: flex; justify-content: space-around;"><div>1</div><div>2</div></div>	
2. AMENDMENT/MODIFICATION NO. <div style="text-align: center;">0005</div>		3. EFFECTIVE DATE <div style="text-align: center;">17-May-2004</div>		4. REQUISITION/PURCHASE REQ. NO.		5. PROJECT NO.(If applicable)	
6. ISSUED BY USA ENGINEER DISTRICT, SEATTLE ATTN: CENWS-CT 4735 EAST MARGINAL WAY SOUTH SEATTLE WA 98134-2329		CODE <div style="text-align: center;">W912DW</div>		7. ADMINISTERED BY (If other than item 6) <div style="text-align: center; font-weight: bold;">See Item 6</div>			
8. NAME AND ADDRESS OF CONTRACTOR (No., Street, County, State and Zip Code)				X		9A. AMENDMENT OF SOLICITATION NO. W912DW-04-R-0017	
				X		9B. DATED (SEE ITEM 11) 06-Apr-2004	
						10A. MOD. OF CONTRACT/ORDER NO.	
						10B. DATED (SEE ITEM 13)	
CODE		FACILITY CODE					
11. THIS ITEM ONLY APPLIES TO AMENDMENTS OF SOLICITATIONS							
<input checked="" type="checkbox"/> The above numbered solicitation is amended as set forth in Item 14. The hour and date specified for receipt of Offer <input checked="" type="checkbox"/> is extended, <input type="checkbox"/> is not extended.							
Offer must acknowledge receipt of this amendment prior to the hour and date specified in the solicitation or as amended by one of the following methods: (a) By completing Items 8 and 15, and returning <u>0</u> copies of the amendment; (b) By acknowledging receipt of this amendment on each copy of the offer submitted; or (c) By separate letter or telegram which includes a reference to the solicitation and amendment numbers. FAILURE OF YOUR ACKNOWLEDGMENT TO BE RECEIVED AT THE PLACE DESIGNATED FOR THE RECEIPT OF OFFERS PRIOR TO THE HOUR AND DATE SPECIFIED MAY RESULT IN REJECTION OF YOUR OFFER. If by virtue of this amendment you desire to change an offer already submitted, such change may be made by telegram or letter, provided each telegram or letter makes reference to the solicitation and this amendment, and is received prior to the opening hour and date specified.							
12. ACCOUNTING AND APPROPRIATION DATA (If required)							
13. THIS ITEM APPLIES ONLY TO MODIFICATIONS OF CONTRACTS/ORDERS. IT MODIFIES THE CONTRACT/ORDER NO. AS DESCRIBED IN ITEM 14.							
A. THIS CHANGE ORDER IS ISSUED PURSUANT TO: (Specify authority) THE CHANGES SET FORTH IN ITEM 14 ARE MADE IN THE CONTRACT ORDER NO. IN ITEM 10A.							
B. THE ABOVE NUMBERED CONTRACT/ORDER IS MODIFIED TO REFLECT THE ADMINISTRATIVE CHANGES (such as changes in paying office, appropriation date, etc.) SET FORTH IN ITEM 14, PURSUANT TO THE AUTHORITY OF FAR 43.103(B).							
C. THIS SUPPLEMENTAL AGREEMENT IS ENTERED INTO PURSUANT TO AUTHORITY OF:							
D. OTHER (Specify type of modification and authority)							
E. IMPORTANT: Contractor <input type="checkbox"/> is not, <input type="checkbox"/> is required to sign this document and return _____ copies to the issuing office.							
14. DESCRIPTION OF AMENDMENT/MODIFICATION (Organized by UCF section headings, including solicitation/contract subject matter where feasible.) <div style="text-align: center;">Central Heat Plant Low Emissions Technology, Malmstrom AFB MN -- See continuation.</div>							
<small>Except as provided herein, all terms and conditions of the document referenced in Item 9A or 10A, as heretofore changed, remains unchanged and in full force and effect.</small>							
15A. NAME AND TITLE OF SIGNER (Type or print)				16A. NAME AND TITLE OF CONTRACTING OFFICER (Type or print)			
				TEL: _____ EMAIL: _____			
15B. CONTRACTOR/OFFEROR _____ (Signature of person authorized to sign)		15C. DATE SIGNED		16B. UNITED STATES OF AMERICA BY _____ (Signature of Contracting Officer)		16C. DATE SIGNED 17-May-2004	

SECTION SF 30 BLOCK 14 CONTINUATION PAGE

The following items are applicable to this modification:CONTINUATION

A. The purposes of this amendment are as follows:

1. Provide a new SF 1442 for submission of revised proposals;
2. To revise the Bid Schedule to verify that CLINs 0001 through 0008 are base items, and CLINs 0009 and 0010 are option items;
3. To revise Section 00800; and
4. To revise Section 15555A.
5. Extend the due date for receipt of proposals to **2:00 PM Pacific Time on 19 May 2004.**

B. The attached revised pages supersede and replace the corresponding pages. The attached revised specification sections supersede and replace the corresponding specification sections. Specification changes are generally identified, for convenience, by strikeout for deletions, and underlining of text for additions. All portions of the revised or new pages shall apply whether or not changes have been indicated.

C. NOTICE TO OFFERORS: Offerors must acknowledge receipt of this amendment by number and date on Standard Form 1442, BACK, Block 19, or by telegram.

D. All amendments are available for download this date on the Army Corps of Engineers website at <http://www.nws.usace.army.mil/ct/>.

Enclosure:

New SF 1442

Revised Bid Schedule

Revised Section 00800

Revised Section 15555A

SOLICITATION, OFFER, AND AWARD <i>(Construction, Alteration, or Repair)</i>	1. SOLICITATION NUMBER	2. TYPE OF SOLICITATION	3. DATE ISSUED	PAGE OF PAGES
	W912DW-04-R-0017	<input type="checkbox"/> SEALED BID (IFB) <input checked="" type="checkbox"/> NEGOTIATED (RFP)	17 May 2004	1

IMPORTANT - The "offer" section on the reverse must be fully completed by the offeror.

4. CONTRACT NUMBER	5. REQUISITION/PURCHASE REQUEST NUMBER	6. PROJECT NUMBER
	W912DW	

7. ISSUED BY	CODE	8. ADDRESS OFFER TO
Seattle District, Corps of Engineers ATTN: CENWS-CT-CB-MU PO Box 3755 Seattle, WA 98124-3755		Seattle District, Corps of Engineers PO Box 3755 ATTN: CENWS-CT-CB-MU Seattle, WA 98124-3755 HAND CARRY: Seattle District Corps of Engineers Contracting Division 4735 East Marginal Way South Seattle, WA 98134-2329

9. FOR INFORMATION CALL	A. NAME	B. TELEPHONE NUMBER (Include area code) (NO COLLECT CALLS)
	Sherrye L. Schmahl	206-764-6588

SOLICITATION

NOTE: In sealed bid solicitations "offer" and "offeror" mean "bid" and "bidder".

10. THE GOVERNMENT REQUIRES PERFORMANCE OF THE WORK DESCRIBED IN THESE DOCUMENTS (Title, identifying number, date):

Furnish all labor, materials and equipment and perform all work for Central Heat Plant application of Low Emissions Tech., Malmstrom AFB, Montana in accordance with the attached Contract Clauses, Special Clauses, Technical Specifications and Drawings.

11. The Contractor shall begin performance within 5 calendar days and complete it within _____ calendar days after receiving

☐ award, ☒ notice to proceed. This performance period is ☒ mandatory, ☐ negotiable. (See * Paragraph SC-1, 00800 .)

12A. THE CONTRACTOR MUST FURNISH ANY REQUIRED PERFORMANCE PAYMENT BONDS?
(If "YES," indicate within how many calendar days after award in Item 12B.)

☒ YES ☐ NO

12B. CALENDAR DAYS

10

13. ADDITIONAL SOLICITATION REQUIREMENTS:

A. Sealed offers in original and _____ copies to perform the work required are due at the place specified in Item 8 by 2:00 p.m. (hour) local time 19 May 2004 (date). If this is a sealed bid solicitation, offers will be publicly opened at that time. Sealed envelope containing offers shall be marked to show the offeror's name and address, the solicitation number, and the date and time offers are due.

B. An offer guarantee ☒ is, ☐ is not required.

C. All offers are subject to the (1) work requirements, and (2) other provisions and clauses incorporated in the solicitation in full text or by reference.

D. Offers providing less than 90 calendar days for Government acceptance after the date offers are due will not be considered and will be rejected.

OFFER (Must be fully completed by offeror)

14. NAME AND ADDRESS OF OFFEROR (Include ZIP Code)

15. TELEPHONE NUMBER (Include area code)

Fax No.:

16. REMITTANCE ADDRESS (Include only if different than Item 14)

Tax ID No:

DUNS No:

eMail:

CODE

FACILITY CODE

17. The offeror agrees to perform the work required at the prices specified below in strict accordance with the terms of this solicitation, if this offer is accepted by the Government in writing within _____ calendar days after the date offers are due. (Insert any number equal or greater than the minimum requirement stated in 13D. Failure to insert any number means the offeror accepts the minimum in Item 13D.)

AMOUNTS



See Page 00010-5

18. The offeror agrees to furnish any required performance and payment bonds.

19. ACKNOWLEDGEMENT OF AMENDMENTS

(The offeror acknowledges receipt of amendments to the solicitation - give number and date of each)

AMENDMENT NO.

DATE

20A. NAME AND TITLE OF PERSON AUTHORIZED TO SIGN OFFER (Type or print)

20B. SIGNATURE

20C. OFFER DATE

AWARD (To be completed by Government)

21. ITEMS ACCEPTED

22. AMOUNT

23. ACCOUNTING AND APPROPRIATION DATA

24. SUBMIT INVOICES TO ADDRESS SHOWN IN
(4 copies unless otherwise specified)

ITEM

26

25. OTHER THAN FULL AND OPEN COMPETITION PURSUANT TO

☐ 10 U.S.C. 2304(c) ()☐ 41 U.S.C. 253(c) ()

26. ADMINISTERED BY

CODE

27. PAYMENT WILL BE MADE BY

USACE - Seattle District
Northwest Area Office
PO Box 92146
Tillicum, WA 98492-0146

US Army Corps of Engineers Finance Center
CEFC-AO-P
5722 Integrity Drive
Millington, TN 38054-500

CONTRACTING OFFICER WILL COMPLETE ITEM 28 OR 29 AS APPLICABLE

☐ 28. NEGOTIATED AGREEMENT (Contractor is required to sign this document and return _____ copies to the issuing office.) Contractor agrees to furnish and deliver all items or perform all work requirements identified on this form and any continuation sheets for the consideration stated in this contract. The rights and obligations of the parties to this contract shall be governed by (a) this contract award, (b) the solicitation, and (c) the clauses, representations, certifications, and specifications incorporated by reference in or attached to this contract.

☐ 29. AWARD. (Contractor is not required to sign this document.) Your offer on this solicitation is hereby accepted as to the items listed. This award consummates the contract, which consists of (a) the Government solicitation and your offer, and (b) this contract award. No further contractual document is necessary.

30A. NAME AND TITLE OF CONTRACTOR OR PERSON AUTHORIZED TO SIGN
(Type or print)

31A. NAME OF CONTRACTING OFFICER (Type or print)

30B. SIGNATURE

30C. DATE

31B. UNITED STATES OF AMERICA

31C. AWARD DATE

BY

DOCUMENT 00010

BID SCHEDULE

PART 1 GENERAL

1.1 BID SCHEDULE

Bid Schedule
Low Emission Central Heat Plant

<u>Item No.</u>	<u>Description of Item</u> <u>Base Items</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
0001	All work for the Application of Low Emissions Technology to Coal-Fired CHP in accordance with the drawings & specifications but not including the work indicated under items 0002 through 0010.	1	JOB	LS	\$_____
0002	All work for As-Built Drawings as Specified in Section 01702 from Preparation to Approval.	1	JOB	LS	\$25,000
0003	All Work for O&M Manuals as Specified in Section 01701 from Preparation to Final Approval.	1	JOB	LS	\$20,000
0004	All Work for Form 1354 Checklist and Equipment in Place List as Specified in Section 01704 & 01705 from Preparation to Final Approval.	1	JOB	LS	\$12,000
0005	All work for the installation of Induced Draft Fan Variable Frequency Drives and Motor Replacement. (HTHW Generators No. 1&3)	1	JOB	LS	\$_____
0006	All work for the Plant Air System Modifications.	1	JOB	LS	\$_____
0007	All work for the Instrument Air System Modification.	1	JOB	LS	\$_____

<u>Item No.</u>	<u>Description of Item</u>	<u>Quantity</u>	<u>Unit</u>	<u>Unit Price</u>	<u>Amount</u>
Optional Items					
0008	All work to comply with Hazardous Material Contractor Authorization Procedures as required by Section 01010-1.8.	1	JOB	LS	\$_____
Optional Items					
Total Base Items					\$_____
0009	Provide Load Simulator System	1	Job	LS	\$_____
0010	All Work for Dustless Unloader (Pug Mill) Replacement	1	Job	LS	\$_____
Total Optional Items					\$_____
Total Base & Optional Items					\$_____

The dollar amounts established in Items No. 0002, 0003 and 0004 shall not be revised by bidders.

-- End of Document --

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SPECIAL CLAUSES

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SC-3	TIME EXTENSIONS
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SPECIAL CLAUSES

SC-1 COMMENCEMENT, PROSECUTION AND COMPLETION OF WORK

The Contractor shall be required to

- (a) commence work under this contract within five [5] calendar days after the date the Contractor receives the notice to proceed,
- (b) prosecute the work diligently, and
- (c) complete the entire work ready for use not later than dates specified on the Heat Plant Schedule below (see Table 1). The time stated for completion shall include final cleanup of the premises.

Table 1: HEAT PLANT SCHEDULE

	ITEM	REMARK	DATE
1	1 st coal generator available for work (Generator #3)	Gas operation on remaining 2 generators and Bailey System operational	04/15/04
2	2 nd coal generator available for work (Generator #1)	1 generator, operation on gas only Bailey System operational	05/01/04
3	Ash system available		04/15/04
4	Plant summer shutdown	All systems available for work	Actual system operation verification during the heat plant season (1 Nov to 30 Dec)
5	Plant restart gas generator (Generator #2)	1 gas generator Bailey System operational	09/15/04 (Note 1 & 2)
6	1 st coal/gas generator available for heating	Gas and/or coal operation All systems operational	11/01/04 (Note 1 & 2)
7	2 nd coal/gas generator available for heating	All systems operational	11/01/04 (Note 1 & 2)
8	Load Simulator		Start anytime except for water tie-ins

Notes: (1) All work shall be completed within two construction seasons prior to 11/15/05. The contractor shall ensure the heat plant is operational by 11/01/04. Contractor shall resume construction impacting heat plant operations on 05/31/05. Continued construction during winter heating season is authorized provided plant heating is not impacted. If note (1) is not complied with, note (2) applies.

(2) See Section 01110 – 1.3.

The completion date is based on the assumption that the successful offeror will receive the notice to proceed no later than 31 May 2004.

SC-1.1 OPTION FOR INCREASED QUANTITY

a. The Government may increase the quantity of work awarded by exercising one or more of the Optional Bid Items ~~0008-0009~~ and ~~0009-0010~~ at any time, or not at all, but no later than sixty [60] calendar days after receipt by Contractor of notice to proceed. Notice to proceed on work Item(s) added by exercise of the option(s) will be given upon execution of consent of surety.

b. The parties hereto further agree that any option herein shall be considered to have been exercised at the time the Government deposits written notification to the Contractor in the mails.

c. The time allowed for completion of any optional items awarded under this contract will be the same as that for the base item(s), and will be measured from the date of receipt of the notice to proceed for the base item(s).

SC-1.2 EXCEPTION TO COMPLETION PERIOD

In case the Contracting Officer determines that completion of the project is not feasible within the completion period(s) stated above, the Contractor shall be responsible for providing means to temporarily heat all the buildings served by the Central Heat Plant CHP (see Section 01110 – 1.3 Table 1) and accomplish such work in the first plant shut down period following the contract completion period and shall complete such work as specified, unless other plant shut down periods are directed or approved by the Contracting Officer.

SC-2. LIQUIDATED DAMAGES - CONSTRUCTION (SEP 2000) (FAR 52.211-12)

(a) If the Contractor fails to complete the work within the time specified in SC – 1.c, or any extension, the Contractor shall pay to the Government as liquidated damages, the sum of \$983 for each day of delay until the work is completed or accepted.

(b) If the Government terminates the Contractor's right to proceed, the resulting damages will continue to accrue until the work is completed. These liquidated damages are in addition to excess cost of repurchase under the Termination clause of the CONTRACT CLAUSES.

SC-3. TIME EXTENSIONS (Sept 2000) (FAR 52.211-13): Time extensions for contract changes will depend upon the extent, if any, by which the changes cause delay in the completion of the various elements of construction. The change order granting the time extension may provide that the Contract completion date will be extended only for those specific elements related to the changed work and that the remaining contract completion dates for all other portions of the work will not be altered. The change order also may provide an equitable readjustment of liquidated damages under the new completion schedule.

SC-5. INSURANCE - WORK ON A GOVERNMENT INSTALLATION (JAN 1997) (FAR 52.228-5)

(a) The Contractor shall, at its own expense, provide and maintain during the entire performance period of this Contract at least the kinds and minimum amounts of insurance required in the Insurance Liability Schedule or elsewhere in the Contract.

(b) Before commencing work under this Contract, the Contractor shall certify to the Contracting Officer in writing that the required insurance has been obtained. The policies evidencing required

insurance shall contain an endorsement to the effect that any cancellation or any material change adversely affecting the Government's interest shall not be effective:

(1) for such period as the laws of the State in which this Contract is to be performed prescribe;
or

(2) until 30 days after the insurer or the Contractor gives written notice to the Contracting Officer, whichever period is longer.

(c) The Contractor shall insert the substance of this clause, including this paragraph (c), in subcontracts under this Contract that require work on a Government installation and shall require subcontractors to provide and maintain the insurance required in the Schedule or elsewhere in the Contract. The Contractor shall maintain a copy of all subcontractors' proofs of required insurance, and shall make copies available to the Contracting Officer upon request.

SC-5.1 REQUIRED INSURANCE IN ACCORDANCE WITH FAR 28.307-2:

(1) Workers' compensation and employer's liability. Contractors are required to comply with applicable Federal and State workers' compensation and occupational disease statutes. If occupational diseases are not compensable under those statutes, they shall be covered under the employer's liability section of the insurance policy, except when Contract operations are so commingled with a Contractor's commercial operation that it would not be practical to require this coverage. Employer's liability coverage of at least \$100,000 shall be required, except in states with exclusive or monopolistic funds that do not permit workers' compensation to be written by private carriers.

(2) General Liability.

(a) The Contracting Officer shall require bodily injury liability insurance coverage written on the comprehensive form of policy of at least \$500,000 per occurrence.

(b) Property damage liability insurance shall be required only in special circumstances as determined by the agency.

(3) Automobile liability. The Contracting Officer shall require automobile liability insurance written on the comprehensive form of policy. The policy shall provide for bodily injury and property damage liability covering the operation of all automobiles used in connection with performing the Contract. Policies covering automobiles operated in the United States shall provide coverage of at least \$200,000 per person and \$500,000 per occurrence for bodily injury and \$20,000 per occurrence for property damage. The amount of liability coverage on other policies shall be commensurate with any legal requirements of the locality and sufficient to meet normal and customary claims.

(4) Aircraft public and passenger liability. When aircraft are used in connection with performing the Contract, the Contracting Officer shall require aircraft public and passenger liability insurance. Coverage shall be at least \$200,000 per person and \$500,000 per occurrence for bodily injury, other than passenger liability, and \$200,000 per occurrence for property damage. Coverage for passenger liability bodily injury shall be at least \$200,000 multiplied by the number of seats or passengers, whichever is greater.

(5) Vessel liability. When Contract performance involves use of vessels, the Contracting Officer shall require, as determined by the agency, vessel collision liability and protection and indemnity liability insurance.

(6) Environmental Liability If this contract includes the transport, treatment, storage, or disposal of hazardous material waste the following coverage is required.

The Contractor shall ensure the transporter and disposal facility have liability insurance in effect for claims arising out of the death or bodily injury and property damage from hazardous material/waste transport, treatment, storage and disposal, including vehicle liability and legal defense costs in the amount of \$1,000,000.00 as evidenced by a certificate of insurance for General, Automobile, and Environmental Liability Coverage. Proof of this insurance shall be provided to the Contracting Officer.

SC-7. PERFORMANCE OF WORK BY THE CONTRACTOR (APR 1984) (FAR 52.236-1): The Contractor shall perform on the site, and with its own organization, work equivalent to at least twenty five percent (25%) of the total amount of work to be performed under the Contract. The percentage may be reduced by a supplemental agreement to this Contract if, during performing the work, the Contractor requests a reduction and the Contracting Officer determines that the reduction would be to the advantage of the Government.

SC-8. PHYSICAL DATA (APR 1984) (FAR 52.236-4): Data and information furnished or referred to below is for the Contractor's information. The Government will not be responsible for any interpretation of or conclusion drawn from the data or information by the Contractor.

(a) Physical Conditions: The indications of physical conditions on the drawings and in the specifications are the result of site investigations by test holes shown on the drawings.

(b) Weather Conditions: Each bidder shall be satisfied before submitting his bid as to the hazards likely to arise from weather conditions. Complete weather records and reports may be obtained from any National Weather Service Office.

(c) Transportation Facilities: Each bidder, before submitting his bid, shall make an investigation of the conditions of existing public and private roads and of clearances, restrictions, bridge load limits, and other limitations affecting transportation and ingress and egress at the jobsite. The unavailability of transportation facilities or limitations thereon shall not become a basis for claims for damages or extension of time for completion of the work.

(d) Right-of-Way: The right-of-way for the work covered by these specifications will be furnished by the Government, except that the Contractor shall provide right-of-way for ingress and egress across private property where necessary to gain access to the jobsite. The Contractor may use such portions of the land within the right-of-way not otherwise occupied as may be designated by the Contracting Officer. The Contractor shall, without expense to the Government, and at any time during the progress of the work when space is needed within the right-of-way for any other purposes, promptly vacate and clean up any part of the grounds that have been allotted to, or have been in use by, him when directed to do so by the Contracting Officer. The Contractor shall keep the buildings and grounds in use by him at the site of the work in an orderly and sanitary condition. Should the Contractor require additional working space or lands for material yards, job offices, or other purposes, he shall obtain such additional lands or easements at his expense.

SC-10. LAYOUT OF WORK (APR 1984) (FAR 52.236-17): The Contractor shall lay out its work from Government-established base lines and bench marks indicated on the drawings, and shall be responsible for all measurements in connection with the layout. The Contractor shall furnish, at its own expense, all stakes, templates, platforms, equipment, tools, materials, and labor required to lay out any

part of the work. The Contractor shall be responsible for executing the work to the lines and grades that may be established or indicated by the Contracting Officer. The Contractor shall also be responsible for maintaining and preserving all stakes and other marks established by the Contracting Officer until authorized to remove them. If such marks are destroyed by the Contractor or through its negligence before their removal is authorized, the Contracting Officer may replace them and deduct the expense of the replacement from any amounts due, or to become due, to the Contractor.

SC-11. RESERVED

SC-12. AIRFIELD SAFETY PRECAUTIONS

(a) Definitions: As used in this clause --

(1) "Landing Areas" means:

(i) the primary surfaces which are comprised of the surface of the runways, the runway shoulders, and the lateral safety zones (the length of each primary surface is the same as the runway length; the width of each primary surface is 610 meters (2,000 feet), 305 meters (1,000 feet) on each side of the runway centerline; (see footnote at end of clause)).

(ii) the "clear zone" beyond the ends of each runway, i.e., the extension of the "primary surface" for a distance of 305 meters (1,000 feet) beyond each end of each runway;

(iii) all taxiways plus the lateral clearance zones along each side for the length of the taxiways (the outer edge of each lateral clearance zone is laterally 76 meters (250 feet) from the far or opposite edge of the taxiway, i.e., a 23 meters (75-foot)-wide taxiway would have a combined width of taxiway and lateral clearance zones of 130 meters (425 feet); and

(iv) all aircraft parking aprons plus the area 38 meters (125 feet) in width extending beyond each edge all around the aprons.

(2) "Safety precaution areas" means those portions of approach-departure clearance zones and transitional zones where placement of objects incident to Contract performance might result in vertical projections at or above the approach-departure clearance surface or the transitional surface.

(i) The "approach-departure clearance surface" is an extension of the primary surface and the clear zone at each end of each runway, for a distance of 15,240 meters (50,000 feet), first along an inclined (glide angle) and then along a horizontal plane, both flaring symmetrically about the runway centerline extended.

(a) The inclined plane (glide angle) begins in the clear zone 61 meters (200 feet) past the end of the runway (and primary surface) at the same elevation as the end of the runway, and continues upward at a slope of 50:1 (.3048 meter (one foot) vertically for each 15.24 meters (50 feet) horizontally) to an elevation of 152 meters (500 feet) above the established airfield elevation; at that point the plane becomes horizontal, continuing at that same uniform elevation to a point 15,240 meters (50,000 feet) longitudinally from the beginning of the inclined plane (glide angle) and ending there.

(b) The width of the surface at the beginning of the inclined plane (glide angle) is the same as the width of the clear zone; thence it flares uniformly, reaching the maximum width of 4,877 meters (16,000 feet) at the end.

(ii) The "approach-departure clearance zone" is the ground area under the approach-departure clearance surface.

(iii) The "transitional surface" is a sideways extension of all primary surfaces, clear zones, and approach-departure clearance surfaces along inclined planes.

(a) The inclined plane in each case begins at the edge of the surface.

(b) The slope of the inclined plane is 7:1 (.3048 meter (one foot) vertically for each 2.13 meters (7 feet) horizontally), and it continues to the point of intersection with

(1) Inner horizontal surface (which is the horizontal plane 46 meters (150 feet) above the established airfield elevation) or

(2) Outer horizontal surface (which is the horizontal plane 152 meters (500 feet) above the established airfield elevation), whichever is applicable.

(iv) The "transitional zone" is the ground area under the transitional surface. (It adjoins the primary surface, clear zone and approach-departure clearance zone.)

(b) General

(1) The Contractor shall comply with the requirements of this clause while

(i) Operating all ground equipment (mobile or station art);

(ii) Placing all materials; and

(iii) Performing all work, upon and around all airfields.

(a) The requirements of this clause are in addition to any other safety requirements of this contract.

(c) The Contractor shall--

(1) Report to the Contracting Officer before initiating any work;

(2) Notify the Contracting Officer of proposed changes to locations and operations;

(3) Not permit either its equipment or personnel to use any runway for purposes other than aircraft operation without permission of the Contracting Officer, unless the runway is--

(i) Closed by order of the Contracting Officer, and

(ii) Marked as provided in paragraph (d)(2) of this clause;

(4) Keep all paved surfaces such as runways, taxiways, and hardstands, clean at all times and, specifically, free from small stones which might damage aircraft propellers or jet aircraft;

(5) Operate mobile equipment according to the safety provisions of this clause, while actually performing work on the airfield. At all other times, the Contractor shall remove all mobile equipment to locations--

(i) Approved by the Contracting Officer,

(ii) At a distance of at least 229 meters (750 feet) from the runway centerline, plus any additional distance; and

(iii) Necessary to ensure compliance with the other provisions of this clause; and

(6) Not open a trench unless material is on hand and ready for placing in the trench. As soon as practicable after material has been placed and work approved, the Contractor shall backfill and compact trenches as required by the contract. Meanwhile, all hazardous conditions shall be marked and lighted in accordance with the other provisions of this clause.

(e) Landing Areas

The Contractor shall--

(1) Place nothing upon the landing areas without the authorization of the Contracting Officer.

(2) Outline those landing areas hazardous to aircraft, using (unless otherwise authorized by the Contracting Officer) red flags by day, and electric, battery-operated low-intensity red flasher lights by night;

(3) Obtain, at an airfield where flying is controlled, additional permission from the control tower operator every time before entering any landing area, unless the landing area is marked as hazardous in accordance with paragraph (d)(2) of this clause;

(4) Identify all vehicles it operates in landing areas by means of a flag on a staff attached to, and flying above, the vehicle. The flag shall be .9144 meters (3 feet) square, and consist of a checkered pattern of international orange and white squares of .3048 meter (1 foot) on each side (except that the flag may vary up to 10 percent from each of these dimensions);

(5) Mark all other equipment and materials in the landing areas, using the same marking devices as in paragraph (d)(2) of this clause; and

(6) Perform work so as to leave that portion of the landing area which is available to aircraft free from hazards, holes, piles of material, and projecting shoulders that might damage an airplane tire.

(e) Safety Precaution Areas

The Contractor shall--

(1) Place nothing upon the safety precaution areas without authorization of the Contracting Officer;

(2) Mark all equipment and materials in safety precaution areas, using (unless otherwise authorized by the Contracting Officer) red flags by day, and electric, battery-operated, low-intensity red flasher lights by night; and

(3) Provide all objects placed in safety precaution areas with a red light or red lantern at night, if the objects project above the approach-departure clearance surface or above the transitional surface.

SC-13. IDENTIFICATION OF GOVERNMENT-FURNISHED PROPERTY (APR 1984) (FAR 52.245-3): The Government will furnish to the Contractor the property identified in the schedule to be incorporated or installed into the work or used in performing the contract. The listed property will be furnished to the Contractor at the place designated by the Contracting Officer. The Contractor is required to accept delivery, pay any demurrage or detention charges, and unload and transport the property to the jobsite at its own expense. When the property is delivered, the Contractor shall verify its quantity and condition and acknowledge receipt in writing to the Contracting Officer. The Contractor shall also report in writing to the Contracting Officer within 24 hours of delivery any damage to or shortage of the property as received. All such property shall be installed or incorporated into the work at the expense of the Contractor, unless otherwise indicated in this contract. Delivery site location for Government Furnished Property is

SC-14. EQUIPMENT OWNERSHIP AND OPERATING EXPENSE SCHEDULE (MAR 1995)-(EFARS 52.231-5000)

(a) This clause does not apply to terminations. See 52.249-5000, Basis for Settlement of Proposals and FAR Part 49.

(b) Allowable cost for construction and marine plant and equipment in sound workable condition owned or controlled and furnished by a contractor or subcontractor at any tier shall be based on actual cost data for each piece of equipment or groups of similar serial and series for which the Government can determine both ownership and operating costs from the contractor's accounting records. When both ownership and operating costs cannot be determined for any piece of equipment or groups of similar serial or series equipment from the contractor's accounting records, costs for that equipment shall be based upon the applicable provisions of EP 1110-1-8, Construction Equipment Ownership and Operating Expense Schedule, Region IV. Working conditions shall be considered to be average for determining equipment rates using the schedule unless specified otherwise by the contracting officer. For equipment not included in the schedule, rates for comparable pieces of equipment may be used or a rate may be developed using the formula provided in the schedule. For forward pricing, the schedule in effect at the time of negotiations shall apply. For retroactive pricing, the schedule in effect at the time the work was performed shall apply.

(c) Equipment rental costs are allowable, subject to the provisions of FAR 31.105(d)(ii) and FAR 31.205-36. Rates for equipment rented from an organization under common control, lease-purchase arrangements, and sale-leaseback arrangements, will be determined using the schedule, except that actual rates will be used for equipment leased from an organization under common control that has an established practice of leasing the same or similar equipment to unaffiliated lessees.

(d) When actual equipment costs are proposed and the total amount of the pricing action exceeds the small purchase threshold, the contracting officer shall request the contractor to submit either certified cost or pricing data, or partial/limited data, as appropriate. The data shall be submitted on Standard Form 1411, Contract Pricing Proposal Cover Sheet.

(e) Copies of EP1110-1-8 "Construction Equipment Ownership and Operating Expense Schedule" Volumes 1 through 12 are available in Portable Document Format (PDF) and can be viewed or downloaded at <http://www.usace.army.mil/inet/usace-docs/eng-pamphlets/cecw.htm>. A CD-ROM containing (Volumes 1-12) is available through either the Superintendent of Documents or Government bookstores. For additional information telephone 202-512-2250, or access on the Internet at http://www.access.gpo.gov/su_docs.

SC-15. PAYMENT FOR MATERIALS DELIVERED OFF-SITE (MAR 1995)-(EFARS 52.232-5000)

(a) Pursuant to FAR clause 52.232-5, Payments Under Fixed Priced Construction Contracts, materials delivered to the contractor at locations other than the site of the work may be taken into consideration in making payments if included in payment estimates and if all the conditions of the General Provisions are fulfilled. Payment for items delivered to locations other than the work site will be limited to:

(1) materials required by the technical provisions; or (2) materials that have been fabricated to the point where they are identifiable to an item of work required under this contract.

(b) Such payment will be made only after receipt of paid or receipted invoices or invoices with canceled check showing title to the items in the prime contractor and including the value of material and labor incorporated into the item. In addition to petroleum products, payment for materials delivered off-site is limited to the following items: Any other construction material stored offsite may be considered in determining the amount of a progress payment.

SC-18. CONTRACT DRAWINGS AND SPECIFICATIONS (AUG 2000)(DOD FAR SUPP 252.236-7001)

(a) The Government will provide to the Contractor, without charge, one set of contract drawings and specifications, except publications incorporated into the technical provisions by reference, in electronic media.

(b) The Contractor shall--

- (1) Check all drawings furnished immediately upon receipt;
- (2) Compare all drawings and verify the figures before laying out the work;
- (3) Promptly notify the Contracting Officer of any discrepancies;
- (4) Be responsible for any errors which might have been avoided by complying with this paragraph (b); and
- (5) Reproduce and print contract drawings and specifications as needed.

(c) In general—

- (1) Large scale drawings shall govern small scale drawings; and
- (2) The Contractor shall follow figures marked on drawings in preference to scale measurements.

(d) Omissions from the drawings or specifications or the misdescription of details of work which are manifestly necessary to carry out the intent of the drawings and specifications, or that are customarily performed, shall not relieve the Contractor from performing such omitted or misdescribed details of the work. The Contractor shall perform such details as if fully and correctly set forth and described in the drawings and specifications.

(e) The work shall conform to the specifications and the contract drawings identified in the index of drawings attached at the end of the Special Clauses.

SC-22. EPA ENERGY STAR: The Government requires that certain equipment be Energy Star compliant. Initially, the sole Energy Star requirement shall be the self certification by the bidder that the specified equipment is Energy Star compliant. Within 3 months of the availability of an EPA sanctioned test for Energy Star compliance, the Contractor shall submit all equipment upgrades and additions for testing and provide proof of compliance to the Government upon completion of testing. Testing shall be at the Contractor's expense.

SC-23. RECOVERED MATERIALS: The Corps of Engineers encourages all bidders to utilize recovered materials to the maximum extent practicable. The attached APPENDIX R contains procurement guidelines for products containing recovered materials.

APPENDIX R

PART 247 - COMPREHENSIVE PROCUREMENT GUIDELINE FOR PRODUCTS CONTAINING RECOVERED MATERIALS

40 CFR Ch. 1 (9-1-99 Edition)

Subpart B-Item Designations

§ 247.10 Paper and paper products.

Paper and paper products, excluding building and construction paper grades.

§ 247.11 Vehicular products.

- (a) Lubricating oils containing re-refined oil, including engine lubricating oils, hydraulic fluids, and gear oils, excluding marine and aviation oils.
- (b) Tires, excluding airplane tire
- (e) Reclaimed engine coolants, excluding coolants used in non-vehicular applications.

247.12 Construction products.

- (a) Building insulation product including the following items:
 - (1) Loose-fill insulation, including but not limited to cellulose fiber, mineral fibers (fiberglass and rock vermiculite, and perlite;
 - (2) Blanket and batt insulation, including but not limited to mineral fibers (fiberglass and rock wool).
 - (3) Board (sheathing, roof decking wall panel) insulation, including but not limited to structural fiberboard and laminated paperboard products perlite composite board, polyurethane, polyisocyanurate, polystyrene, phenolics, and composites; and
 - (4) Spray-in-place insulation, including but not limited to foam-in-place polyurethane and polyisocyanurate and spray-on cellulose.
- (b) Structural fiberboard and laminated paperboard products for applications other than building insulation, including building board, sheathing shingle backer, sound deadening board, roof insulating board, insulating wallboard, acoustical and non-acoustical ceiling tile, acoustical and non-acoustical lay-in panels, floor underlayments, and roof overlay (cover board).
- (c) Cement and concrete, including concrete products such as pipe and block, containing coal fly as ground granulated blast furnace (GGBF) slag.
- (d) Carpet made of polyester fiber use in low- and medium-wear applications.
- (e) Floor tiles and patio block containing recovered rubber or plastic.
- (f) Shower and restroom dividers/partitions containing recovered plastic or steel.
- (g) (1) Consolidated latex paint used for covering graffiti; and
- (2) Reprocessed latex paint used for interior and exterior architectural applications such as wallboard, ceilings, and trim; gutter boards; and concrete, stucco, masonry, wood and metal surfaces.

§247.13 Transportation products.

- (a) Traffic barricades and traffic cones used in controlling or restricting vehicular traffic.
- (b) Parking stops made from concrete or containing recovered plastic or rubber.
- (c) Channelizers containing recovered plastic or rubber.
- (d) Delineators containing recovered plastic, rubber, or steel.

- (e) Flexible delineators containing recovered plastic.

§ 247.14 Park and recreation products

- (a) Playground surfaces and running tracks containing recovered rubber or plastic.
- (b) Plastic fencing containing recovered plastic for use in controlling snow or sand drifting and as a warning/safety barrier in construction or other applications.

247.15 Landscaping products.

- (a) Hydraulic mulch products containing recovered paper or recovered wood used for hydroseeding and as an over-spray for straw mulch in landscaping, erosion control, and soil reclamation.
- (b) Compost made from yard trimmings, leaves, and/or grass clippings for use in landscaping, seeding of grass or other plants on roadsides and embankments, as a nutritious mulch under trees and shrubs, and in erosion control and soil reclamation.
- (c) Garden and soaker hoses containing recovered plastic or rubber.
- (d) Lawn and garden edging containing recovered plastic or rubber.

§ 247.16 Non-paper office product.

- (a) Office recycling containers and office waste receptacles.
- (b) Plastic desktop accessories.
- (c) Toner cartridges.
- (d) Binders.
- (e) Plastic trash bags.
- (f) Printer ribbons.
- (g) Plastic envelopes.

§ 247.17 Miscellaneous products.

Pallets containing recovered wood, plastic, or paperboard.

INDEX OF DRAWINGS

Central Heating Plant Application of Low Emissions Tech., Malmstrom AFB

Drawing file number: N/A

SHEET NUMBER	PLATE NUMBER	TITLE	REVISION NUMBER	DATE
1	T1.1	Cover Sheet/Vicinity Map		05 Mar 2004
2	G1.1	Flow Diagram (1 of 2)		05 Mar 2004
3	G1.2	Flow Diagram (2 of 2)		05 Mar 2004
4	M1.1	Plan @ El. 3410'-6"+/- (Operating Floor)		05 Mar 2004
5	M1.2	Plan @ El. 3438'-6 +/- (Coal Scale Floor)		05 Mar 2004
6	M1.3	Partial Plans @ El. 3461'-0"+/- & 3503'-0" +/- (Roof & Stack Platform)		05 Mar 2004
7	M1.4	Partial Plans @ El. 3392'-6"+/-, El. 3410'-6"+/-, & El. 3432'-6"+/-		05 Mar 2004
8	M2.1	Sections (1 of 3)		05 Mar 2004
9	M2.2	Sections (2 of 3)		05 Mar 2004
10	M2.3	Sections (3 of 3)		05 Mar 2004
11	M3.1	Details (1 of 2)		05 Mar 2004
12	M3.2	Details (2 of 2)		05 Mar 2004
13	S1.1	Platform Framing Plans		05 Mar 2004
14	S1.2	Platform Framing Plans		05 Mar 2004
15	S1.3	Load Simulator Foundation Plan & Misc. Plans		05 Mar 2004
16	S2.1	Framing Elevations		05 Mar 2004
17	S3.1	Sections & Details		05 Mar 2004
18	S3.2	Sections & Details		05 Mar 2004
19	E1.1	Electrical Single Line Diagram		05 Mar 2004

SHEET NUMBER	PLATE NUMBER	TITLE	REVISION NUMBER	DATE
20	E2.1	Electrical Plan Operating Level		05 Mar 2004
21	E2.2	Electrical Plan Mezzanine Level		05 Mar 2004
22	E2.3	Electrical Plan Coal Scale Level		05 Mar 2004
23	E2.4	Electrical Plan Roof Level		05 Mar 2004
24	E3.1	Motor Control Center Elevations		05 Mar 2004
25	E3.2	Control Architecture Diagrams		05 Mar 2004
26	E3.3	Electrical Schedules		05 Mar 2004
27	R1	Main Induced Draft Fan		03 May 2004

Revisions by Notation

Drawing M3.1, Sheet 11 of 26.

Add the following new note to Section 1:

Raise the elevation of the new coal grate flame scanner from that shown in order to avoid welding below the exiting tube bends and to avoid modification of the existing armor block. In addition, the flame scanners may need to be directed at an angle below the horizontal in order to proper detect the presence of flame across the width of the furnace. The burner manufacturer shall be responsible for setting the elevation of the flame scanner above the grate as well as its angle of installation in order to provide a fully functional system.

STANDARD DETAILS BOUND IN THE SPECIFICATIONS

DRAWING NUMBER	SHEET NUMBER	TITLE	DATE
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SECTION 01501 - CONSTRUCTION FACILITIES AND TEMPORARY CONTROLS

1 & 2	U.S. Air Force Project Construction Sign	84JUN20
1	Hard Hat Sign	10SEP90

END OF SECTION

SECTION 15555A

MODIFICATIONS TO CENTRAL HIGH TEMPERATURE WATER (HTW) GENERATING PLANT AND
AUXILIARIES

PART 1 GENERAL

1.1 REFERENCES

The publications listed below form a part of this specification to the extent referenced. The publications are referred to in the text by basic designation only.

ASME INTERNATIONAL (ASME)

ASME B31.1	(2001) Power Piping
ASME BPVC SEC I	(2001) Boiler and Pressure Vessel Code; Section I, Power Boilers
ASME BPVC SEC IX	(2001) Boiler and Pressure Vessel Code; Section IX, Welding and Brazing Qualifications
ASME BPVC SEC VIII D1	(2001) Boiler and Pressure Vessel Code; Section VIII, Pressure Vessels Division 1 - Basic Coverage
ASME PTC 4.1	(1964; Addenda: 1968, 1969; R 1991) Steam Generating Units ++
ASME PTC 4.1	(1964; Addenda: 1968, 1969; R 1991) Steam Generating Units ++

ASTM INTERNATIONAL (ASTM)

ASTM A 36/A 36M	(2001) Carbon Structural Steel
ASTM A 366/A 366M	(1997e1) Steel, Sheet, Carbon, Cold-Rolled, Commercial Quality **
ASTM A 568/A 568M	(2001) Steel, Sheet, Carbon, and High- Strength, Low-Alloy, Hot-Rolled and Cold- Rolled
ASTM A 653/A 653M	(2001a) Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot-Dip Process
ASTM C 155	(1997) Standard Classification of Insulating Firebrick
ASTM C 27	(1998) Fireclay and High-Alumina Refractory Brick

ASTM C 34 (1996) Structural Clay Load-Bearing Wall Tile

ASTM C 401 (1991; R 2000) Alumina and Alumina-Silicate Castable Refractories

ASTM C 62 (2001) Building Brick (Solid Masonry Units Made from Clay or Shale)

NATIONAL FIRE PROTECTION ASSOCIATION (NFPA)

NFPA 85 (2001) Boiler and Combustion Systems Hazard Code

UNDERWRITERS LABORATORIES (UL)

UL 795 (1999) Commercial-Industrial Gas Heating Equipment

1.2 GENERAL REQUIREMENTS

1.2.1 Standard Products

Material and equipment shall be the standard products of a manufacturer regularly engaged in the manufacture of the products and shall essentially duplicate items that have been in satisfactory use for at least 2 years prior to bid opening. Equipment shall be supported by a service organization that is, in the opinion of the Contracting Officer, reasonably convenient to the site.

1.2.2 Nameplates

Each major item of equipment shall have the manufacturer's name, address, type or style, model or serial number, and catalog number on a plate secured to the item of equipment.

1.2.3 Prevention of Rust

Unless otherwise specified, surfaces of ferrous metal subject to corrosion shall be factory prime painted with a rust inhibiting coating and subsequently factory finish painted in accordance with the manufacturer's standard practice. Equipment exposed to high temperature when in service shall be prime and finish painted with the manufacturer's standard heat resistant paint to a minimum thickness of 1 mil.

1.2.4 Equipment Guards and Access

Belts, pulleys, chains, gears, couplings, projecting setscrews, keys, and other rotating parts exposed to personnel contact shall be fully enclosed or guarded. High temperature equipment and piping exposed to contact by personnel or where it creates a fire hazard shall be properly guarded or covered with insulation of a type specified.

1.2.5 Use of Asbestos Products

Products which contain asbestos are prohibited. This prohibition includes items such as packings or gaskets, even though the item is encapsulated or the asbestos fibers are impregnated with binder material.

1.3 SUBMITTALS

Government approval is required for submittals with a "G" designation; submittals not having a "G" designation are for information only. The following shall be submitted in accordance with Section 01330, "SUBMITTAL PROCEDURES":

SD-02 Shop Drawings

Gas Burners; G.

Detail drawings consisting of schedules, performance charts, brochures, diagrams, drawings, and instructions necessary for installation of equipment, and for piping, wiring, and devices. Complete setting plans certified by the equipment manufacturers. Drawings shall indicate clearances required for maintenance and operation and shall contain complete wiring and schematic diagrams, equipment layout and anchorage, and any other details required to demonstrate that the system has been coordinated and will properly function as a unit.

Combustion Air Ductwork; G.

Flue Gas Breeching; G.

Replacement Tubes; G.

Detail drawings describing materials of construction, dimensions, weights, support, and layout in both plan and elevation.

SD-03 Product Data

Spare Parts;

Spare parts data for each item of equipment provided, after approval of the drawings and not later than 3 months before the date of beneficial occupancy. The data shall include a complete list of spare parts and supplies, with current unit prices and source of supply, and a list of the parts recommended by the manufacturer to be replaced after 1 and 3 years of service.

Manufacturer's Instructions;

Proposed diagrams, instructions, and other sheets, before posting. Framed instructions under glass or in laminated plastic, including wiring and control diagrams showing the complete layout of the entire system, shall be posted where directed. Condensed operating instructions explaining preventive maintenance procedures, methods of checking the system for normal safe operation, and procedures for safely starting and stopping the system shall be prepared in typed form, framed as specified above for the wiring and control diagrams, and posted beside the diagrams. The framed instructions shall be posted before acceptance testing of the systems.

Welding Qualifications;

A copy of qualified welding procedures and a list of names and identification symbols of qualified welders and welding operators.

Field Training;

Proposed schedule for field training, at least 2 weeks prior to the start of related training.

SD-06 Test Reports

Test Schedule; G.

A written schedule, 7 days before tests are performed. Schedule will be approved by the Contracting Officer.

Proposed Test Procedure;

A proposed performance test procedure, 30 days prior to the proposed test date. The submittal shall contain a complete description of the proposed test with calibration curves or test results furnished by an independent testing laboratory of each instrument, meter, gauge, and thermometer to be used in the tests. The test shall not commence until the procedure has been approved.

Boiler Emissions Report; G.

Boiler emissions report of air pollutants showing compliance with the limits established in the environmental permit and as specified herein.

Adjusting, Balancing, Testing and Inspecting; .

Test reports in booklet form showing field tests performed to adjust each component and field tests performed to prove compliance with the specified performance criteria, upon completing and testing the installed system. Each test report shall indicate the final position of controls. A written statement from the manufacturer's representative certifying that combustion control equipment has been properly installed and is in proper operating condition, upon completion of the installation. The action settings for automatic controls in the form of a typed, tabulated list indicating the type of control, location, setting, and function shall be included.

Startup Test Hardcopy Printout; .

Printed report of control system startup test.

SD-07 Certificates

Environmental Permit Compliance; Experience; G.

Evidence of the Contractor's prior experience in installing similar equipment, including a list of 5 co-firing (simultaneous

natural gas & coal) and stoker applications combustion control installations (Bailey/ABB INFI-90) on boilers of equal or larger size that have been in satisfactory operation for 2 years prior to bid opening. Provide the location of the combustion control installations.

Certificates of Inspection, Test, and Calibration

Certificate of inspection, test, and calibration of instrumentation to be used during acceptance testing. Certificate of compliance with applicable codes after installation.

SD-10 Operation and Maintenance Data

Gas Burners;

Operating instructions, prior to the field training course. Six copies of operating instructions outlining the step-by-step procedures required for system startup, operation, and shutdown. The instructions shall include the manufacturer's name, model number, service manual, parts list, and brief description of all equipment and their basic operating features. Maintenance instructions, prior to the field training course. Six complete copies of maintenance instructions listing routine maintenance procedures, possible breakdowns and repairs, and troubleshooting guides. The instructions shall include piping layout, equipment layout, and simplified wiring and control diagrams of the system as installed. The manuals shall also include equipment lubrication requirements and schedules, recommended spare parts list, index, instruction book binders with hard back covers and printing to identify the name of the facility, Government entity operating the facility, Contractor, shop order, equipment, and volume number if required. Operation and maintenance manuals shall be approved prior to the training course.

1.4 WELDING QUALIFICATIONS

Piping shall be welded in accordance with qualified procedures using performance qualified welders and welding operators. Procedures and welders shall be qualified in accordance with ASME BPVC SEC IX. Welding procedures qualified by others, and welders and welding operators qualified by another employer may be accepted as permitted by ASME B31.1. The Contracting Officer shall be notified 24 hours in advance of tests and the tests shall be performed at the work site if practicable. The welder or welding operator shall apply his assigned symbol near each weld he makes as a permanent record.

1.5 DELIVERY AND STORAGE

All equipment delivered and placed in storage shall be stored with protection from the weather, humidity and temperature variation, dirt and dust, or other contaminants.

1.6 VERIFICATION OF DIMENSIONS

The Contractor shall become familiar with all details of the work, verify all dimensions in the field, and shall advise the Contracting Officer of any discrepancy before performing the work.

PART 2 PRODUCTS

2.1 MODIFICATIONS TO HIGH TEMPERATURE WATER GENERATORS

Existing HTW generator (boiler) No. 1 is capable of operation on coal or natural gas. Existing Boiler No. 2 is capable of operation on natural gas only. Existing Boiler No. 3 is capable of operation on coal only. Boiler No. 1 and No. 3 each have an input capacity of 106 MMBtu/hr and an output capacity of 85 MMBtu/hr when operating on coal, when operating with 305 degrees F entering water temperature and 414 degrees F leaving water temperature with a water flow of 736,249 pounds per hour. Boiler No. 1 and No. 2 each have a capacity of approximately 30 MMBtu/hr when operating on natural gas only. Each boiler has a design pressure of 500 psig.

Modifications shall include all controls, piping, insulation, miscellaneous plant equipment, and other accessories indicated or necessary for the following major work elements:

- a. Removal of gas burner from HTW generator No. 1 and associated boiler wall repair.
- b. Addition of two 25 MMBtu/hr input to each gas burner on each HTW generator. No. 1 and No. 3, one on each side of boiler and associated tube bending and boiler wall work.
- c. Addition of combustion air bypass and flue gas bypass around existing air heater on HTW generator No. 1 and No. 3.
- d. Replacement of baskets and seals in Ljungstrom air heaters for Generators No. 1 and No. 3.

The equipment design and accessory locations shall permit accessibility for maintenance and service. Design conditions shall be as follows:

- a. Site elevation, 3,527 feet.
- b. Combustion air temperature, 80 degrees F.

The HTW generators shall be capable of operating continuously at maximum specified capacity without damage or deterioration to the generator, its setting, or firing equipment or auxiliaries. The generator shall be operable automatically while burning the fuel specified.

2.1.1 Electrical Equipment

Electric motor-driven equipment shall be provided complete with motors and necessary motor control devices. Motors and motor control devices shall be as specified in Division 16 specifications. Enclosures for electrical equipment shall be NEMA 4 or NEMA 12. Motors shall have electrical characteristics and enclosure type as shown. Unless otherwise indicated, motors of 1 hp and above shall be high efficiency type.

2.1.1.1 Motor Ratings

Motors shall be suitable for the voltage and frequency provided. Motors 1/2 horsepower and larger shall be three phase, unless otherwise indicated. Ratings shall be adequate for the duty imposed, but shall not be less than indicated.

2.1.1.2 Motor Starters

Where a motor starter is not indicated in a motor control center on the electrical drawings, a motor starter shall be provided under this section of the specifications. Motor starters shall be provided complete with properly sized thermal overload protection and other equipment at the specified capacity including an allowable service factor, and other appurtenances necessary. Manual or automatic control and protective or signal devices required for the operation specified, and any wiring required to such devices, shall be provided whether indicated or not. Where two-speed or variable-speed motors are indicated, solid-state variable-speed controllers may be provided to accomplish the same function.

2.1.2 HTW Generator Design Requirements

2.1.2.1 Furnace Dimensions

Existing furnace dimensions are as follows:

- a. Width (new burner firing direction), 12.46 feet.
- b. Depth, 13.13 feet.
- c. Height, 22 feet.

2.1.2.2 Burners

Burners shall conform to requirements of NFPA 85, except as otherwise specified. Flame safeguard controls shall be equipped with repetitive self-checking circuits.

2.2 HIGH TEMPERATURE WATER GENERATOR MODIFICATION DETAILS

2.2.1 HTW Generators and Components

Watertube, waterwall type HTW generating units shall be modified for the installation of gas burners, with the associated modifications to the existing over fire air system. Walls of the HTW generating units shall be modified to accommodate the installation, removal and rearrangement of gas burner using similar materials of construction and as shown on the contractors drawings.

2.2.1.1 Headers

Existing HTHW generator nameplate data is as follows:

HTHW Generator No. 1:
International Boiler Works Co.
Model TJW-VC-85

Serial No. 14891
IBW Job No. 2068-69-70
Heating Surface:
Boiler: 5,975 square feet
Waterwall: 1,284 square feet

HTHW Generator No. 3:
International Boiler Works Co.
Model TJW-VC-85
Serial No. 14892
IBW Job No. 2068-69-70
Heating Surface:
Boiler: 5,975 square feet
Waterwall: 1,284 square feet

Note: The International Boiler Works Co. is defunct. For information concerning existing HTW Generators and Components contact:

International Boiler, Inc.
Attn: Jeffrey Beals
3000 NE 30 Place, Suite 109
Ft. Lauderdale, FL 33306
phone: (954) 537-7787
fax: (954) 537-7785

2.2.1.2 Tubes

Replacement services and tubes for tube sections shown on the contract drawings shall be provided by International Boiler, Inc. at the Contractor's expense. Tubes shall be electric welded or seamless steel. Boilers shall have water-cooled furnace walls of a design suitable for the application. Tubes located in the primary furnace shall be designed for inclined or upflow of water. The water shall be distributed to the heating surface in proportion to the heat absorbing capacities of these surfaces. Tube heat absorbing surfaces shall be located so that radiant and convection sections provide for series flow of water, from generator inlet to outlet, to ensure uniform water distribution and uniform temperature rise from inlet to outlet.

2.2.1.3 Furnace

Existing furnace side walls and rear wall are water-cooled by vertical tubes with center-to-center spacing not to exceed twice the tube diameter, and are furnished with cast-iron, water-cooled armor block at the grate line to a height of not less than 18 inches above the grate line. The armor block are keyed and held in place without the use of bolts, pins, or mastic. The existing armor block shall be protected from damage during this work. See note added to Section 1 on Drawing M3.1 for revisions to the height of the new coal grate flame scanner to avoid having to modify the existing armor block.

2.2.2 HTW Generator Setting Materials

Materials shall conform to the following:

- a. Firebrick: ASTM C 27, class shall conform to industry standards and ASME.

- b. Insulating Brick: ASTM C 155, Class A.
- c. Castable Refractory: ASTM C 401. The minimum modulus of rupture for transverse strength shall not be less than 600 psi after being heat-soaked for 5 hours or more at a temperature in excess of 3000 degrees F.
- d. Mortar, Air-Setting, Refractory: Shall conform to industry standards and ASME.
- e. Brick, Common: ASTM C 62.
- f. Tile, Load-Bearing, Hollow: ASTM C 34, Grade LBX.
- g. Iron and Steel Sheets: Galvanized, ASTM A 653/A 653M; gauge numbers specified refer to United States Standard gauge. Uncoated, black: ASTM A 568/A 568M, ASTM A 366/A 366M, or ASTM A 36/A 36M.

2.2.2.1 HTW Generator Casing

HTW generator walls shall be steel-encased wall construction with fabrication details as recommended by the HTW generator manufacturer. HTW generator wall lining shall consist of a continuous screen of closely spaced water tubes. Casing for HTW generators shall be double wall construction. Reinforced, welded, gas-tight inner casing shall be constructed of not lighter than 10 gauge black steel sheets. Outer casing shall be constructed of not less than 10 gauge steel sheets. Outer casing may be either bolted or welded. Inner casing shall be reinforced with structural steel to provide rigidity and prevent buckling. Inner casing in furnace section shall abut furnace tubes with no foreign sealer between the tube steel and the casing steel. Casing shall not be attached to tubes. The inner casing shall be applied so as to form expansion joints at the point of tube support. Welded joints and openings shall be checked by a pressure test. Any casing leakage shall be repaired and made pressure-tight. The maximum deflection of the reinforced panels shall not exceed 1/360 of the length of the maximum span. Block insulation shall be applied between the inner and outer casings and held securely with insulating pins. The casing tested shall be capable of holding a pressure of 1-1/2 times the predicted maximum furnace operating pressure of .15 inH₂O (.28 mmHg).

2.2.2.2 Walls

High temperature block and mineral wool blanket shall be provided between an inner and outer casing. Thickness of insulation shall match adjacent construction.

2.2.2.3 Firebrick

Firebrick shall be laid up in air-setting mortar. Each brick shall be dipped in mortar, rubbed, shoved into its final place, and then tapped with a wooden mallet until it touches the adjacent bricks. Mortar thick enough to lay with a trowel shall not be permitted. Maximum mortar joint thickness shall not exceed 1/8 inch and average joint thickness shall not exceed 1/16 inch.

2.2.2.4 Plastic Refractory

Plastic refractory shall be installed in accordance with the manufacturer's recommendation and by workmen skilled in its application.

2.2.3 Boiler Fittings and Appurtenances

HTW generator fittings and appurtenances suitable for a HTW design pressure of 500 psig and 470 degrees F shall be installed with each HTW generator in accordance with ASME BPVC SEC I.

2.3 NATURAL GAS FUEL BURNING EQUIPMENT

MW Output	(Size) Type of Grate and Stoker
735 - 5860	Single retort, stationary grate, underfeed stokers
5860 - 8800	Single retort, moving grate, underfeed stoker
1465 - 22000 stoker	Reciprocating grate, front continuous ash discharge
1465 - 29500 discharge stoker	Vibrating conveyor grate, front continuous ash
5860 - 36500 grate stoker	Water-cooled, incline grate, hopper fed vibrating
8800 - 120,000	Spreader stoker, continuous front ash discharge

(MBtuh Output	(Size) Type of Grate and Stoker
2,500 - 20,000	Single retort, stationary grate, underfeed stokers
20,000 - 30,000	Single retort, moving grate, underfeed stoker
5,000 - 75,000 stoker	Reciprocating grate, front continuous ash discharge
5,000 - 100,000 discharge stoker	Vibrating conveyor grate, front continuous ash
20,000 - 125,000 grate stoker	Water-cooled, incline grate, hopper fed vibrating
30,000 - 400,000	Spreader stoker, continuous front ash discharge)

Natural gas fuel burning equipment shall be provided complete with flame safeguard system, forced draft low NO_x burner, combustion air

windbox, piping, fuel train and instrumentation. Fuel burning equipment shall be designed for a maximum allowable working pressure of 40 psig. Each burner shall be capable of firing at a continuous rating of 25 MMBtu/hr input when the boiler is firing natural gas only, using natural gas at 9 psi. When co-firing with coal, each burner shall not run higher than 15 MMBtu/hr input. Provisions shall be incorporated for withdrawing and shielding the gas burner from over heating while firing coal only. Emissions guarantees shall apply through specified turndown range. Flue gas recirculation shall not be utilized. Burner shall have a stable flame over the turndown range. Primary air spinner zone, zone divider and main burner shall be removable without removing the entire register or windbox. Register front plate shall have a swivel scanner and observation port. Natural gas fuel burning equipment shall limit emissions to 0.15 pounds of NOx/MMBtu of heat input.

2.3.1 Pilot

- a. Pilot burner shall be natural gas-electric type with the capacity required to reliably light off the boiler. A high voltage secondary side ignition transformer shall be supplied and mounted backside of the windbox.
- b. Provision shall be made in the burner housing for inspection of the pilot flame.
- c. Pilot shall be provided with individual manual shut-off valve, pressure gauge, strainer, pressure regulation separate from the main burner, self closing solenoid valve and vent valve in accordance with FM P7825a, FM P7825b and UL 795. Pilot and valving shall be in accordance with NFPA 85.

2.3.2 Burner Refractory Throat

Burner refractory throat shall be made of high quality castable refractory suitable for 3000 degrees F. The precast refractory in a steel retaining ring with stainless steel anchors shall be shipped separately for field mounting on the boiler. Burner refractory throat shall be concentric with the burner, contoured to ensure complete mixing of air and natural gas, and designed to assist in complete combustion by radiating heat to the fuel. Burner shall be so positioned that the flame parallels the contour of the burner refractory throat but avoids striking the refractory.

2.3.3 Windbox

Windbox shall provide even airflow. Windbox shall not interfere with boiler smoke box door operation and shall have a flange bottom for easy firm mounting on a support structure.

2.3.4 Combustion Air Fan

Combustion air fan shall be centrifugal type with backwardly inclined air foil bladed wheel. Combustion air-fan wheel shall be directly driven by a TEFC NEMA frame motor and shall be complete with inlet cone and screen and flange outlet. Combustion air fan shall be bottom flanged to be mounted on same structural member as windbox. Combustion air-fan shall be minimum sized to provide sufficient static pressure to overcome system losses when providing 15 percent excess air at maximum firing rate.

2.3.5 Combustion Air Damper and Jack Shaft Control

Combustion air damper shall be flanged and located at combustion air fan inlet. Combustion air damper shall be mechanically linked with an adjustable jack shaft that automatically adjusts the amount of combustion air supply required for the specified burner capacity turndown.

2.3.6 Natural Gas Burner

Natural gas burner shall be a multi-spud burner with gas feed pipe in center of air register for easy removal. Natural gas burner shall be forced draft type and shall be suitable for efficiently burning natural gas having a calorific value of 1,000 Btu per cubic foot when supplied at a pressure of approximately 9 psig. Natural gas shall be discharged in burner throat area. Natural gas-air premix or natural gas discharged outside of burner throat are not acceptable. Main natural gas burner shall be capable of firing the boiler to maximum capacity with a turndown of five (5) to one (1) with a 4-20 mA signal.

2.3.7 Natural Gas Burner Retract Equipment

Each natural gas burner shall be provided with a pneumatic actuator for retracting the gas burner nozzle from the refractory burner throat and a guillotine refractory damper with a pneumatic actuator that seals the refractory burner throat opening after the natural gas burner nozzle is retracted. The damper shall be provided with a seal air fan that limits the amount of air inleakage to the furnace to a maximum of 55 scfm when the damper is in the closed position. Refractory for the guillotine damper shall be as specified herein. Pneumatic actuators shall be piston and cylinder type, sealed and double acting. Cylinders and pistons shall be sized for operating 125 percent of the required load with an instrument air pressure range of 70-120 psig. Piping for each pneumatic actuator shall be complete including tubing, fittings, filter regulator set, four-way 120 VAC solenoid valve, speed control valves, isolation and bypass valves and a single point connected with the instrument air system. The assembly shall include mechanically operated position switches, DPDT, to indicate inserted and retracted positions for the gas burner nozzle retract actuator and open and closed positions for the guillotine damper actuator. The natural gas burner retract equipment shall be manually controlled from the burner management system control panels next to the new burner platforms. Controls shall be provided with appropriate interlocks for safe operation of the burner retract equipment. As a minimum, the burner shall not be capable of being retracted with natural gas flow. The burner management system control panel shall be provided with position indicating lights for burner nozzle inserted and retracted and guillotine damper closed and open.

2.3.8 Flame Safeguard System

- a. The flame safeguard system per burner shall be manufactured by burner manufacturer and mounted near the boiler as a panel. Flame safeguard system components shall be UL listed. Complete and automatic flame safeguard system shall be provided in accordance with NFPA requirements for safe start-up, on-line operation and shut-down of package burner.

- b. Flame safeguard system shall be micro-processor per boiler based system including, but not limited to, automatic burner sequencing, flame supervision, status indication, fire-out annunciation and self diagnostics.
- c. Flame safeguard system cabinet shall house overcurrent protective devices and motor starters for the combustion air fan motor and burner damper motor. Control transformers and an RS-232C serial communication port shall also be included.
- d. Flame scanner shall not require a separate purge air supply. Flame scanner output signal shall be connected to flame amplifier module in microprocessor based unit. Within four seconds after loss of flame, flame safeguard controller shall shut the automatic safety shut-off fuel valves and open the gas automatic vent valve. Flame failure signal shall be displayed on flame safeguard display or burner control panel.
- e. A separate adjustable coal grate flange scanner shall be provided for each boiler above the grate as shown on the contract drawings.
- f. Logic provided with flame safeguard system shall:
 - 1. Prevent introduction of ignitor flame (pilot) or main fuel flame to furnace until furnace, boiler passes, breeching and stack have been purged of combustible gases.
 - 2. Prevent opening of automatic fuel shut-off valves in main fuel line until ignitor flame is proven.
 - 3. Limit trial for main fuel ignition to ten (10) seconds from time ignitor flame is proven.
 - 4. In event of burner failure, operator intervention shall be required to manually reset flame safeguard controller prior to restart.
 - 5. Allow gas burner startup without a pre-purge cycle, when coal is being combusted as detected by the coal grate flame scanner.
- g. First-out annunciation per burner shall be provided by an expansion module. Alarms and flame-outs shall be individually annunciated at panel front and transmitted along with other process points monitored by the panel to existing Bailey DCS for graphic display. The following points, at a minimum, shall be individually annunciated by flame safeguard system:
 - 1. High outlet water temperature (from DCS).
 - 2. High and low natural gas pressure.
 - 3. Low oxygen concentration (from DCS).
 - 4. Low water flow (from DCS).
 - 5. Combustion airflow.

6. Ignitor failure.
7. Main flame failure.
8. Furnace pressure (from DCS).
- h. Flame safeguard system cabinet shall be provided for natural gas fuel.
- i. Indicating lights shall also be provided for following:
 1. Limits satisfied.
 2. Purging.
 3. Pilot ON.
 4. Main flame ON.
 5. Flame failure.
 6. Natural gas ON.
- j. Indicating pilot lights shall be industrial, oil-tight construction with push-to-test feature or "All-Pilot Lights" test button.

2.3.9 Boiler Piping Trains

Piping train shall be completely prepiped, wired and mounted on boiler. Natural gas train shall be in accordance with NFPA and FM standards and requirements and shall include but not be limited to following items:

2.3.9.1 Natural Gas Trains

- a. NFPA 54 and ANSI Z83.3.
- b. Natural gas flow control valve with characterizing adjustments to match airflow.
- c. Y-type strainer supplied in ignitor natural gas line.
- d. Two (NC) solenoid safety shut-off valves, in series, in ignitor line with one (NO) solenoid vent valve located between safety shut-off valves, piped independently to atmosphere through the roof.
- e. Two motorized shut-off valves with proof of closure, piped in series in main gas line with one (NO) solenoid vent valve located between safety shut-off valves, piped independently to atmosphere through the roof.
- f. One pressure regulating valve in ignitor natural gas line to regulate natural gas pressure to ignitor.
- g. Pressure gauge, with shut-off valve for main natural gas at burner.
- h. Pressure gauge, with shut-off valve for natural gas ignitor.

- i. Low natural gas pressure switch.
- j. High natural gas pressure switch.

2.4 WASTE HEAT RECOVERY EQUIPMENT

Each existing boiler is equipped with an air preheater, separate from the boiler, which preheats combustion air that is delivered beneath the grate when firing coal. Bypasses, complete with opposed or parallel blade dampers as shown on the contract drawings, shall be added on both the combustion air and flue gas sides of the existing air heaters serving Boiler No. 1 and No. 3.

2.5 OVERFIRE AIR DUCT MODIFICATIONS

Overfire air ducts shall be relocated to accommodate burner installation on the right side of HTHW Generators No. 1 & 3. In addition, cast iron fly ash reinjection nozzles (three per generator) shall be removed and a new 2 inch diameter overfire air duct shall be installed from the existing overfire air header to the new Detroit Stoker overfire air nozzles in the rear wall of HTHW Generators No. 1 & 3. Size of overfire air nozzles shall match existing.

2.6 UNDER GRATE AIR DUCT MODIFICATIONS

Under grate air duct bypasses around air heaters shall be constructed of 3/16 inch thick steel plate conforming to ASTM A 36/A 36M. Ductwork shall be adequately reinforced and braced with structural steel angles not smaller than 2 x 2 x 3/16 inches on no more than 10 foot spacing, and all joints and seams in the sheets and angles shall be welded. Expansion joints shall be installed as indicated and as required to suit the installation and shall be flexible type requiring no packing. Ductwork shall have angle flanges and gaskets for connection to equipment. Ductwork connections shall be gas-tight and caulked-tight all around and sealed with cement to form an air-tight joint. Clean-out openings of suitable size and at approved locations shall be provided for access to all sections of the breeching and shall have tight-fitting, hinged, cast-iron doors with cast-iron frames.

2.7 BREECHING MODIFICATIONS

Breeching bypasses around air heaters shall be constructed of 3/16 inch thick steel plate conforming to ASTM A 36/A 36M. Breeching shall be adequately reinforced and braced with structural steel angles not smaller than 2 x 2 x 5/16 inches on no more than 2 foot spacing, and all joints and seams in the sheets and angles shall be welded. Expansion joints shall be installed as indicated and as required to suit the installation and shall be flexible type requiring no packing. Breeching shall have angle flanges and gaskets for connection to equipment. Breeching connections shall be gas-tight and caulked-tight all around and sealed with cement to form an air-tight joint. Clean-out openings of suitable size and at approved locations shall be provided for access to all sections of the breeching and shall have tight-fitting, hinged, cast-iron doors with cast-iron frames.

2.8 FABRIC EXPANSION JOINTS

2.8.1 General

Fabric expansion joints shall be integral flanged, U-belt design consisting of flexible element, backing bars, flow baffle, nuts, bolts and washers and have an operating temperature suitable for 300 degrees F on combustion air ductwork and 500 degrees F on flue gas breeching.

Acceptable manufacturers or approved equal of these joints are the following:

- a. Frenzelit North America Inc. - Purcellville, VA 540-338-2076.
- b. Advanced Flexible Systems, Inc. - Charleston, SC 800-724-4175.
- c. Hutch Engineering, Inc. - Canton, GA 770-751-9123.
- d. Senior Flexonics Pathway - New Braunsfels, TX 800-292-2152.
- e. Papco Industries, Inc. - Northvale, NJ 201-767-9051.

Flexible element, backing bars, and flow baffle shall be drilled to match adjacent breeching or equipment flanges. In open sections of breeching, the maximum spacing between hole centers shall be 6 inches. Design shall allow fit between adjacent breeching or equipment without disassembly of the adjoining breeching or equipment. Flow direction shall be marked on the expansion joint.

2.8.2 Flexible Element

The flexible element shall be designed to uncouple the forces and moments between adjoining sections due to thermal expansion while maintaining structural integrity. Design shall simultaneously allow .5 inches of compression, 1 inch of lateral relative motion and 1 degree of rotation in any plane. The flexible element material shall be suitable for the design temperature and contact with flue gas from coal combustion with a 2.50 to 3.81 percent sulfur coal.

2.8.3 Backing Bars

Backing bars shall be provided for the full width and circumference of the seal. Backing bars shall be ASTM A 36, a minimum of 2 inches wide by 3/8 thick, free of burrs and sharp edges, and coated with a rust-resistant primer.

2.8.4 Flow Baffle

The flow baffle shall be ASTM A 36 carbon steel, 1/8 inch thick, bolt-in design, fastened between flexible element and adjacent breeching or equipment flange, designed to protect flexible element from particulate abrasion throughout the range of thermal movements.

2.8.5 Fasteners

Fasteners shall be 5/8 inch bolts with flat washer between the bolt head and the backing bar, and a lock washer between the nut and adjacent breeching or equipment flange. Bolts shall be of adequate length to expose a minimum of two (2) threads beyond the nut after tightening. Bolts dimensions shall be in accordance with ASME B18.2.1 and be threaded in accordance with ASME B1.1, Class 2A. Bolts shall be ASTM A 307, Grade B, zinc-coated for operating temperatures up to 550 degrees F and ASTM A 193, Grade B7, heavy hex for operating temperatures above 550 degrees F. Nut dimensions shall be in accordance with ASME B18.2.2 and threaded in accordance with ASME B1.1, Class 2B. Nuts shall be ASTM A 563, Grade A, zinc-coated, heavy hex for

operating temperatures up to 550 degrees F and ASTM A 194 Grade 7, heavy hex for operating temperatures above 550 degrees F.

2.9 LOUVER DAMPERS

2.9.1 General

Louver dampers shall be balanced weight, multiple blade type. Blades shall be opposed blade (combustion air) or parallel blade (flue gas and minimum leak,) as indicated on the Contract Drawings. Opposed blade dampers shall be designed for throttling service. Blade dampers shall be designed for shut-off service and shall be provided with sealed blade ends. Dampers shall be designed for a maximum shut-off pressure of 5 inches of water and a maximum temperature of 550 degrees F. Design shall allow fit between adjacent breeching or equipment without disassembly of the adjoining breeching or equipment.

2.9.2 Detailed Requirements

The frame shall be 12 inch, 20.7 pound channel with 5/8 inch diameter holes on a maximum of 6 inch center spacing. Blades shall be 10 gauge carbon (minimum) steel, bolted, double skin, air foil design. Blade seals shall be overlap and stepped. Shafts shall extend the total length of the blades and be Type 304 stainless steel. Brackets, linkages, bearings and packing shall be located and be serviceable from outside the gas stream. Bearings shall be graphite, self-lubricated, rated for 1000 degrees F service. The brackets and linkages shall be carbon steel. Non-machined, metal surfaces shall be power tool cleaned, solvent washed, and coated with a primer suitable for 500 degrees F.

2.9.3 Operator

The dampers shall be provided with a pneumatic actuator integrally mounted on the frame. The design shall be sized to operate satisfactorily with a 60 to 80 psig instrument air supply. Dampers designed for modulating service shall be provided with positioners suitable for 4 to 20 mA signal, with direct or reverse feedback. The selection and arrangement of the spring, solenoid, positioner, if required for modulating service, and the wiring and pneumatic connections shall meet the air and electrical failure positions specified on the Contract Drawings. Speed control on damper to open to closed in 1.0 minutes and closed to open in 1.0 minutes.

2.10 INSULATION

Shop and field applied insulation shall be as specified in Section 15080A "THERMAL INSULATION FOR MECHANICAL SYSTEMS".

2.11 TOOLS

Special tools only shall be furnished and shall include all uncommon tools necessary for the operation and maintenance of controls, meters and other equipment. Small hand tools shall be furnished with a suitable cabinet, mounted where directed.

2.12 ASH HANDLING SYSTEM

2.12.1 Boiler Room Ash Handling System

The existing ash handling system is of the dry pneumatic type. This system gathers ash from the boiler under grate and bottom ash hoppers, mechanical dust collector, and the baghouse hoppers, and discharges to the ash storage silo located outside of the building. An existing ash dust control conditioner is used to reduce fugitive dust emissions during discharge of ash from the storage silo. This ash dust conditioner (dustless unloader) shall be replaced with a new ash unloader system in accordance with Section 14710, "Ash Unloader System."

2.13 MODIFICATIONS TO EXISTING LJUNGSTROM AIR HEATERS (GENERATORS NO. 1 & 3)

Existing air heaters are the regenerative type constructed of materials adequate to withstand the corrosion effects of the flue gases. Modifications shall preclude cold-end corrosion of the air heater under any load condition. Temperatures of all metals in contact with flue gas shall be above the flue gas maximum dewpoint temperature for the fuel being fired under all load conditions. Control shall be by automatic bypass and shall be integrated with the combustion control system.

The existing air heaters were manufactured by:

Air Preheater Company
Alstom Power Inc.
3020 Traux Road, P.O. Box 372
Wellsville, NY 14895
Contract No. LAP-4128
Size 3-13 FIK
Serial Nos. 6992, 6993 or 6994

2.13.1 Modifications to Reduce the Heat Transfer Rate and Meet the Following Operating Conditions

Contractor shall replace existing hot end and cold end gasketed heating elements with new having reduced heat transfer capabilities. Seals and mounting hardware installation shall also be replaced to reduce leakage from air side to flue gas side.

Combustion air and flue gas bypasses shall be installed around the air heater to provide further reduction of heat transfer. With HTHW generator loads above approximately 80 percent, spray dryer absorber (SDA) inlet temperature shall be controlled using modulating dampers on the combustion air side of the air heater (D-1 & D-2). This normal mode of operation shall maintain a flue gas temperature of 350 degrees F to the SDA, allowing the SDA to operate at its optimum efficiency. A special condition will exist when HTHW generator outlet flue gas temperature drops below 414 degrees F. At this time the combustion air side shall track in full bypass, and the flue gas side shall go into bypass. As the load increases and the HTHW generator outlet flue gas temperature increases above 430 degrees F, the flue gas bypass dampers (D-3 & D-4) shall go out of bypass mode. The combustion air side shall be released from track and allowed to modulate, controlling the SDA inlet temperature at 350 degrees F.

Load	100%	90%	80%
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Flow Rates Lbs/Hr			
Air Entering	80,066	56,100	25,500
Air Leaving	65,266	42,000	13,000
Gas Entering	92,693	88,270	80,872
Gas Leaving	107,493	102,370	93,372
Cold Air Bypassed	7,495	26,583	50,889
Leakage	14,800	14,100	12,500
	15.97%	15.97%	15.46%

Temperatures Deg. F			
Air Entering	68	68	68
Air Leaving	152	157	226
Mixed Air to Grate	143	121	100
Gas Entering	448	431	414
Gas Leaving w/o Leakage	393	392	391
Gas Leaving w/ Leakage	351	350	350
Average Cold End	231	230	230

Pressure Diff. In. W.G.			
Pressure Drop Air	0.15	0.10	0.05
Pressure Drop Gas	0.35	0.30	0.30
Hot End Diff.	8.90	8.20	7.10
Cold End Diff.	9.40	8.60	7.45

2.13.2 Material List of Changes

Material list of changes shall include:

Item No.	Description	Qty	U/M
1	Cold End Full Sector Baskets	2	Sets
2	Hot End Full Sector Baskets	2	Sets
3	Hot & Cold Radial Seals;	2	Sets
	Holding Strips; Heavy Fasteners	2	Sets
4	Hot & Cold Circ. Seals;	2	Sets
	Holding Strips; Fasteners	2	Sets
5	Hot & Cold Post Seals	2	Sets
6	Hot End Circ. Clamp Assy.	2	Sets

2.13.3 Service Engineer

Service engineer from manufacturer shall perform:

Inspection during field construction and approval of construction methods/quality.

Field performance test on each unit in operation over operating load range.

PART 3 EXECUTION

3.1 MODIFICATION OF BOILER AND AUXILIARY EQUIPMENT

Equipment shall be installed as indicated and in accordance with manufacturers' instructions.

Alternations to HTHW generators shall be made in accordance with the established standards, procedures, and applicable codes. Maintenance of the HTHW generator ASME stamp certification shall be ensured. Alternations to HTHW generators shall not be initiated without authorization of a special boiler inspector authorized by the State of Montana and the National Board of Boiler and Pressure Vessel Inspectors. Contractor performing alterations to HTHW generators shall hold a National Board "R" stamp. Special boiler inspector shall inspect HTHW generator alterations.

3.2 FIELD PAINTING AND COATING

Except as otherwise specified, ferrous metal shall be cleaned, prepared, and painted as specified in Section 09900 PAINTS AND COATINGS. Exposed pipe covering shall be painted as specified in Section 09900 PAINTS AND COATINGS. Aluminum sheath over insulation shall not be painted.

3.3 TESTS

3.3.1 Hydrostatic Tests

Following modification of tubes, HTW generator No. 1 and No. 3 shall be tested hydrostatically and proved tight under a gauge pressure of 1-1/2 times the specified working pressure. Following the installation of all piping and boiler house equipment, but before the application of any insulation, hydrostatic tests shall be made and the system proved tight under gauge pressures of 1-1/2 times the specified working pressure. Tests shall be made under the direction of, and subject to, the approval of the Contracting Officer. The Contractor shall adjust all equipment and controls before the scheduled operational test. A testing schedule shall be submitted at least 15 days before scheduled test.

Note: The boilers each have isolation valves, though they cannot be guaranteed to hold.

- a. The boiler MAWP's are 500#.
- b. Each boiler has two safety relief valves, one set at 500# and one set at 515#.
- c. The safety valves have 4"-300# flanged inlets and 6"-150# flanged outlets.

3.3.1.1 Water Sides Including Fittings and Accessories

Water sides shall be hydrostatically tested in accordance with the requirements of ASME BPVC SEC I and ASME BPVC SEC VIII D1 as applicable.

3.3.1.2 Generator Casing, Air Casings, and Ducts

Leak testing shall be limited to work performed under this contract as follows:

- a. New Furnace Tube Work:
 - Pressurize furnace to +0.15 inches of water using F.D. fan and O.F.A. fan; smoke bomb test.
- b. Burner Windboxes:
 - Temporarily block new refractory throat; pressurize using new burner F.D. fan; soap test.
- c. Combustion Air Ductwork:

Close under grate blast gate (at windbox); pressurize using existing F.D. fan; soap test.

d. Flue Gas Breeching:

Close spray dryer inlet damper and spray dryer baghouse bypass damper; pressurize furnace using F.D. fan and O.F.A. fan; smoke bomb test.

3.3.2 Capacity and Efficiency Tests, Burners Only

The capacity and efficiency at the specified capacity of the generator shall be determined in accordance with the ASME PTC 4.1 for steam generating units adjusted for High Temperature Hot Water units. The efficiency shall be determined by the direct input-output method and shall be checked with the loss method computation. Test runs shall be made at the maximum capacity for 4 hours; at the minimum capacity and at 50 percent capacity for 2 hours each, respectively. Test reports and performance curves shall be submitted to the Contracting Officer. Before any operational tests are conducted, the system shall be correctly balanced within 5 percent of that indicated. Corrections and adjustments shall be made as necessary to produce the required conditions. Approved methods shall be used to measure all rates of flow. The efficiency and general performance tests on the boilers shall be conducted by a qualified test engineer furnished by the Contractor, and observed by a representative of the Contracting Officer. Testing apparatus shall be set up, calibrated, tested, and readied for testing the boiler before the arrival of the representative of the Contracting Officer. Calibration curves or test results furnished by an independent testing laboratory for each instrument, meter, gauge, and thermometer to be used in efficiency and capacity test shall be furnished before the test. A test report including logs, heat balance calculations, and tabulated results together with conclusions shall be delivered in quadruplicate. An analysis of the fuel being burned on the test shall be submitted to the Contracting Officer. The analysis shall include all pertinent data tabulated in the ASME PTC 4.1 abbreviated efficiency test. The Contractor shall provide and install all necessary piping, valves, controls, and heat exchanger to provide a load for testing each HTW generator. If any system load is available, the Contracting Officer will provide for loading the heating system for the test, but full-load capability will probably require the supplementary heat exchanger for the test. Should Item No. 0009, Provide Load Simulator System, not be awarded, it will be acceptable to postpone testing, without penalty to the Contractor, until such time as the Government can provide a full system load from existing buildings and equipment.

3.3.3 Operating Tests, Burners Only

After adjustment and achievement of stable operation of the HTW generators, each shall be tested continuously for 12 hours, minimum, to demonstrate control and operational conformance to the requirements of this specification under varying load conditions ranging from the specified capacity to the minimum burner turndown ratio without on-off cycling. In each case, the operating tests shall cover the periods for the capacities tabulated below:

Waterwall Watertube Boilers

Time (minimum)	Percent of Capacity
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First 2 hours	20
Next 2 hours	50
Next 2 hours	75
Next 6 hours*	100

* The efficiency tests may be conducted either concurrently with the operating tests or separately at the option of the Contractor.

3.3.4 Operating Tests, Burners and Stoker

After adjustment and achievement of stable operation of the HTW generators, each shall be tested continuously for 12 hours, minimum, to demonstrate control and operational conformance to the requirements of this specification under varying load conditions ranging from the specified capacity to the minimum burner and stoker turndown ratio without on-off cycling. In each case, the operating tests shall cover the periods for the capacities tabulated below:

Waterwall Watertube Boilers

Time (minimum)	Boiler Percent of Capacity	Burners Heat Input
Time (minimum)	Boiler Percent of Capacity	Heat Input per Burner
First 2 hours	35	10-x-105 MMBtu/hr
Next 2 hours	50	10-x-10 MMBtu/hr
Next 2 hours	75	12-x-10 MMBtu/hr
Next 6 hours*	100	15-x-10 MMBtu/hr

* The efficiency tests may be conducted either concurrently with the operating tests or separately at the option of the Contractor.

3.3.5 Test of Natural Gas Fuel Burning Equipment

- a. Test of fuel burning equipment shall demonstrate that equipment installed will meet requirements of specifications, and that overall efficiency is as specified, with not over 15 percent excess air, can be obtained with burners operating at 100 percent capacity without flame impingement on any combustion chamber wall, floor, baffle or watertube. Protect the grates from overheating.
- b. Test shall include all boiler and burner interlocks, safety interlocks, combustion controls, actuators, valves, controllers, gauges, thermometers, pilot lights, switches, etc. prior to combustion testing. All malfunctioning components shall be replaced. Submit an itemized data record sheet of this component testing.
- c. Each boiler control system and all boiler appurtenances shall be calibrated and set to ensure the specified performance. The fuel burner, forced-draft fan, controls, etc. shall be fully coordinated, manually capable, and automatically controllable to hold the required settings. The boiler fuel burning system shall be continuously variable throughout the specified operating range without manual adjustment of burner, register or nozzle, and turndown shall be achieved without manual adjustment. Testing apparatus shall be set up, calibrated, tested and ready for use

prior to final combustion testing. Calibration certificates for all test instruments shall be furnished with test data.

3.3.5.1 Sequencing

The HTW generator shall start, operate, and stop in accordance with the specified operating sequence.

3.3.5.2 Flame Safeguard

The operation of the flame safeguard control on gas-fired burners shall be verified by simulated flame and ignition failures. Burners having continuous or intermittent pilots shall be tested by simulating main flame failure while the pilot is burning. The trial-for-pilot ignition, trial-for-main-flame ignition, combustion control reaction, and valve closing times shall be verified by stop watch.

- a. Immunity to Hot Refractory: The burner shall be operated at high fire until the combustion chamber refractory reaches maximum temperature. The main fuel valve shall then be closed manually. The combustion safeguard shall drop out immediately causing the safety shutoff valves to close within the specified control reaction and valve closing times.
- b. Pilot Intensity Required: The fuel supply to the pilot flame shall be gradually reduced to the point where the combustion safeguard begins to drop out (sense "no flame") but holds in until the main fuel valve opens. At this point of reduced pilot fuel supply, the pilot flame shall be capable of safely igniting the main burner. If the main fuel valve can be opened on a pilot flame of insufficient intensity to safely light the main flame, the generator shall be rejected.
- c. Turndown Ratio: The specified turndown ratio shall be verified by firing at the minimum firing rate.
- d. HTW Generator Limit and Fuel Safety Interlocks: Safety shutdown shall be caused by simulating interlock actuating conditions for each generator limit and fuel and safety interlock. Safety shutdowns shall occur in the specified manner.
- e. Combustion Controls: The accuracy range and smoothness of operation of the combustion controls shall be demonstrated by varying the demand throughout the entire firing range required by the turndown ratio specified for the burner and stoker and in the case of automatic sequenced burners by further varying the firing rate to require on-off cycling. The control accuracy shall be as specified.
- f. Safety Valves: Safety valves on HTW generators shall not be tested under operating conditions.

3.4 CLEANING OF HTW GENERATORS AND PIPING

3.4.1 HTW Generator Cleaning

After the hydrostatic tests have been made, and before performance of the operating tests, the tubes modified under this project, from the upper header to the lower header shall be thoroughly and effectively cleaned of foreign materials. Wherever possible, surfaces to be cleaned that are in contact with water shall be wire brushed to remove loose material, the fire side need not be cleaned. The Contractor may use the following procedure or may submit his own standard procedure for review and approval by the Contracting Officer. HTW generators shall be filled with a solution consisting of the following proportional ingredients for every 1000 gallons of water, and operated at approximately 30 to 50 psig for a period of 24 to 48 hours:

24 lb. caustic soda; 8 lb. sodium nitrate; 24 lb. disodium phosphate, anhydrous; and 1/2 lb. approved wetting agent.

Chemicals in the above proportions, or as otherwise approved, shall be thoroughly dissolved in the water before being placed in the HTW generator. After the specified boiling period, the boilers shall be allowed to cool, and then drained and thoroughly flushed. Piping shall be cleaned by operating the HTW generators for a period of approximately 48 hours.

3.5 MANUFACTURER'S SERVICES

Services of a manufacturer's representative who is experienced in the installation, adjustment, and operation of the equipment specified shall be provided. The representative shall supervise the installing, adjusting, and testing of the equipment. Contractor shall provide a minimum of two (2) weeks of burner manufacturer's representative on site for combustion control adjustment. Scheduling shall coincide with the visit of the manufacturer's representative for the variable frequency drives for the ID fan motors. Service engineers shall startup, calibrate and place in automatic operation the following:

1. Burner & Burner Management System
2. Bypass dampers and controls
3. I.D. fan motor VFD

The following additional field services shall be provided:

1. One day of field labor to witness loop testing of burner management field wiring. Indicated in writing if not satisfied with all field wiring at the end of this period, or wiring will be treated as acceptable.
2. Three days of field assistance during boiler "ASME power code test". The above assistance time periods are not necessarily contiguous. Field service engineer shall oversee and manage the boiler "boil-out", burner adjustment, ASME power code test, and Demonstration. This field service engineer will not be replaced during startup without prior written notice and consent of the Contracting Officer. If any phase of startup or commissioning is delayed because additional parts are required, the burner and burner management service engineer shall remain in the field.
3. System will be acceptable when the system is in automatic control operating at 10 MMBtu/hour load changes in one (1) minute from low load to high load or high to low load, or intermittent swing loads without

noticeable pulsation, and the manufacturer's service engineer is not adjusting controllers on natural gas. The following performance guarantees shall be demonstrated to the Contracting Officer. The system shall be operated within the range of 10 MMBtu/hour to 50 MMBtu/hour (heat input) with load swings of 10 MMBtu/hour/minute in either direction. All measurements will be made using 15 minute averaging. The system shall be operated in the automatic mode only without burner and combustion controls adjustment. The following guarantees shall be demonstrated:

	Natural Gas Only
Particulate Matter EPA Method 1-5 (270 degrees F Filter)	0.005 lbs/10 million Btu
Particulate Matter (Opacity EPA Method 9)	Less than 10%
Nitrogen Oxides (NO & NO2) EPA Method 7E	0.15 lbs/million Btu Heat Input
Carbon Monoxide EPA Method 10B	0.11 lbs/million Btu Heat Input
From Minimum Load, Heat Input	20%
To Maximum Load, Heat Input	100%

4. Provide five (5) man days of operational training by the burner service engineer. The service shall not adjust the system during this week. This week will also be used as the operational acceptance test. If the service engineer needs to adjust the burner or controls, then this week will be repeated at no additional cost.

5. Retain the services International Boiler, Inc. to inspect and approve all generator tube work and casing/insulation work.

3.5.1 Field Training

A field training course shall be provided for designated operating staff members. Training shall be provided for a total period of 2 weeks of normal working time and shall start after the system is functionally complete and adjusted, but prior to final acceptance tests. Field training shall cover all of the items contained in the approved operating and maintenance instructions. Field training time is separate from startup and adjustment.

-- End of Section --